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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/930,133	08/16/2001	Hiroshi Hozoji	500.40506X00	1256

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EXAMINER	
CHAMBLISS, ALONZO	

ART UNIT	PAPER NUMBER
2827	

DATE MAILED: 06/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application N .	Applicant(s)	
	09/930,133	HOZOJI ET AL.	
	Examiner	Art Unit	
	Alonzo Chambliss	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21,23-27,30 and 31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *23* is/are allowed.

6)☒ Claim(s) *1-21,24-27,30 and 31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 4/19/04 has been entered.

Response to Arguments

2. Applicant's arguments filed 3/4/04 have been fully considered but they are not persuasive.

In regards to Launay not having a wiring disposed on the support. The slant portion of the strip layer is disposed on the support. Therefore, the wiring is disposed on the support by way of the strip layer (see Figs. 4 and 5).

In regards to Launay not having a pad of the wiring 15 formed on the inclined portion of the insulating strip layer. The attorney states on page 18 line 9 **rather, wiring 15 is disposed on the inclined portion of the strip layer 3.**

In regards to Launay not having an insulating strip layer provided at a circumferential/peripheral portion of the substrate. Launay discloses an insulating strip layer 3 provided at a circumferential/peripheral portion of the substrate (see Figs. 1, 4, and 5).

In regards to Launay failing to have the entire principle surface of the wiring substrate (on which the semiconductor device is mounted) to be planar (i.e. a flat surface). Launay discloses a flat surface (i.e. planar) on the entire principle surface of the wiring substrate at the mounting portion of the substrate located at the conductive material 17 (see Figs. 4 and 5). Also, the bottom of the recess has a planar surface and the top surface of the substrate is planar. Therefore, the substrate has two parallel planes that are planar.

In regards to Launay and Yukawa combine could not have been realized therefrom noting that usage of the material, purpose, the way respective insulating layers are applied. This argument is deemed unpersuasive for the same rationale on page 3 paragraph 2 of the final rejection filed on 11/19/03.

In regard to Claim 6, Launay shape of the strip layer is a frame shape (i.e. area enclosed in a border) (see Figs. 1, 4, 5, and 10-12).

In regards to Claim 7, Launay discloses wherein an inclination of an inner circumferential side has a gradual slope than that of an outer circumferential side of the insulating resin layer 3 (see Fig. 10).

In regards to Claim 8, It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a plurality of insulating resin layers instead of one insulating layer, since it has been held that mere duplication of the essential working pads of a device involves routine skill in the ad. St. Regis Paper Co. B. Bemis Co., 193 USPQ 8. Therefore, one skilled in the ad at the time of the invention would readily recognize having a plurality of insulating resin layers outside the

peripheral portion of the substrate, since the plurality resin layers would improve the stress between devices created by each component made of different materials.

In regards to claim 3 and 4, Launay-Yakawa both fail to disclose wherein the insulating resin layer has a shape defined by a printed pattern. However, it is well known when applying a resin layer or film by a mask printing process would yield printed pattern of the resin as evident by Shoji (see col. 7 lines 59-63; Figs. 5 and 6c).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 2, 5-8, 10-14, 24, 26, 27, 30, and 31, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) in view of Yukawa (U.S. 6,436,733).

With respect to Claims 1, 2, 26, and 27, Launay discloses a wiring substrate 2 (i.e. support with connection terminal 9 and wiring 15) on which wiring 15 is formed. A semiconductor device 1 is electrically connected to the wiring 9, 15 by connection terminals 17 is mounted on a principle side and electrically connected to the wiring 15, the principle side having a planar surface over its entirety. The external connection terminal 8 arranged on a same side of the wiring substrate 2 to which the semiconductor device 1 is mounted (see col. 1 lines 40-53 and col. 4 lines 31-59; Figs. 2-27). A thermoplastic material layer (i.e. insulating strip layer 3) has a inclined portion at a given inclination to the mounting surface and a flat portion which is almost flat and which is thicker than the semiconductor device 1 between the wiring substrate 2 and the external connection terminal 8 (see col. 1 lines 61-67;Figs. 2-27). Pad of the wiring 15 is formed on the inclined portion of the insulating strip layer 3. The insulating layer 3 is formed on a circumferential portion of the substrate 2 (see Figs. 4 and 5). The external connection electrode 8 enables electrical connection between wiring 15 formed on the insulating material 3 to external devices located external to the module. Launay does not explicitly disclose insulating strip layer 3 utilized as a stress-relaxing layer as the claimed invention. However, it has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural

limitations. *Ex parte Masham, 2 USPQ2d 1647 (1987).* Therefore, the strip layer taught by Launay discloses the same structure as the claimed invention. Launay does not explicitly disclose a thermoplastic material including a resin and a heat conductive material formed on the external substrate to which the semiconductor module is mounted and the semiconductor device of the semiconductor module is connected to the heat conductive material layer. However, Yukawa discloses thermoplastic material 12a, 12b in the form of a resin (see col. 4 lines 14-18). A heat conductive material layer 24 is formed on the external substrate to Therefore, one skilled in the art would have readily recognized that an insulating resin is made of thermoplastic material, since a thermoplastic resin it used in high temperature electronic packaging applications and relieve stress between devices having different material as taught by Yukawa.

With respect to Claim 5, Launay discloses wherein the insulating resin layer 3 has a shape of almost enclosing said semiconductor device 1 (see F g. 3).

With respect to Claim 6, Launay discloses wherein the insulating resin layer 3 is frame-shaped (see Figs. 4, 5, and 10-12).

With respect to Claim 7, Launay discloses wherein an inclination of an inner circumferential side has a gradual slope than that of an outer circumferential side of the insulating resin layer 3 (see Fig. 10).

With respect to Claims 8, 30, and 31, Launay discloses the claimed invention except for a plurality of insulating resin layers are used instead of insulating resin layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a plurality of insulating resin layers instead of one

insulating layer, since it has been held that mere duplication of the essential working pads of a device involves routine skill in the art. St. Regis Paper Co. B. Bemis Co., 193 USPQ 8. Therefore, one skilled in the art at the time of the invention would readily recognize having a plurality of insulating resin layers outside the peripheral portion of the substrate, since the plurality resin layers would improve the stress between devices created by each component made of different materials.

With respect to Claim 10, Yukawa discloses wherein the insulating resin layer 12a may be made of an insulating material having an elastic modulus of 3Gpa (see col. 4 lines 14-21).

With respect to Claim 11, Yukawa discloses wherein a film thickness pf the insulating resin layer 12a is between 50 micrometers (see col. 12 lines 15-17).

With respect to Claim 12, Yukawa disclose: wherein the semiconductor device is a ball grid array (BGA) (see Fig. 1), since the external connecting terminals can be placed on the external connection terminal (i.e. contact zones) of Launay to provide external connection to an external device, and ah wafer-level CSP.

With respect to Claims 13 and 14, Launay discloses wherein a sum of a thickness of the insulating resin layer 3 and a height of the external connection terminal 8 is greater than and almost equal to the distance from the mounted surface of the semiconductor device 1 to a rear surface thereof (see Figs. 4 and 5).

With respect to Claim 24, Launay discloses a metal member 17 connecting said semiconductor device to the substrate 2 (see Figs. 13-16).

With respect to Claim 27, Launay discloses an intermediate plate 15 in the insulating material 3 between the semiconductor device 1 and the external connection terminal 8 (see Figs. 4 and 5).

5. Claims 3 and 4, insofar as definite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) and Yukawa (U.S. 6,436,733) as applied to claim 1 above, and further in view of Shoji (U.S. 6,054,171).

With respect to Claims 3 and 4, Launay-Yukawa both fail to disclose wherein the insulating resin layer has a shaped defined by a printed pattern. However, it is well known when applying a resin layer or film by a mask printing process would yield printed pattern of the resin as evident by Shoji (see col. 7 lines 59-63; Figs. 5 and 6c).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) and Yukawa (U.S. 6,436,733) as applied to claim 1 above, and further in view of Hembree (U.S. 6,242,932).

With respect to Claim 9, Launay-Yukawa does not explicitly disclose the wiring substrate that is made of glass. However, it is well known in the semiconductor industry that a substrate can be made of glass as evidence by Hembree (see col. 5 lines: 66-67). Therefore, one skilled in the art at the time of the invention would readily recognize utilizing glass for the material of the substrate, since the glass provides a stable material for attaching semiconductor devices on as taught by Hembree.

7. Claims 15-19, 21, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753) and Yukawa (U.S. 6,436,733) as applied to claims 1 and 2 above, and further in view of Lee (U.S. 5,986,334).

With respect to Claims 15-17 and 25, Launay-Yukawa both to disclose the claimed invention except for a semiconductor device mounted on a wiring substrate without using an underfill. However, Lee discloses a semiconductor device 10 mounted on a wiring substrate 20 (i.e. a body 20 have leads 23A, 238 on the surface) without using an underfill. The semiconductor device is die attached the substrate 20 by wire bonding (see Figs. 1A, 1C, 2 and 3). Therefore, it would have been obvious to one skilled in the ad to attach a semiconductor device without using an underfill, since wire bonding the semiconductor device to the wiring substrate would not require an underfill as taught by Lee.

With respect to Claim 18, Yukawa discloses wherein the insulating resin layer 12a may be made of an insulating material having an elastic modulus of 3Gpa (see col. 4 lines 14-21).

With respect to Claim 19, Yukawa discloses wherein a film thickness of the insulating resin layer 12a is between 50 micrometers (see col. 12 lines 15-17).

With respect to Claim 21, Launay discloses the claimed invention except for a second insulating resin layer are used instead of insulating resin layer. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have a second insulating resin layer instead of one insulating layer, since it has been held that mere duplication of the essential working pads bf a device involves routine skill in the art. St. Regis Paper Co. v. Bemis Co., 193 USPQ 8. Therefore, Launay discloses applicant's claimed invention of a second insulating resin layer. 21

8. Claim 20 is rejected under 36 U.S.C. 103(a) as being unpatentable over Launay (U.S. 6,320,753)-Yukawa (U.S. 6,4:6,733) and Lee (U.S. 5,986,334) as applied to claims 1 and 16 above, and further in view of Shoji (U.S. 6,064, 171).

With respect to Claim 20, Launay-Yukawa-Lee all fail to disclose wherein the insulating resin layer has a shaped defined by a printed pattern. However, it is well known when applying a resin layer or film by a mask printing process would yield printed pattern of the resin as evident by Shoji (see col. 7 lines 59-63; Figs. 5 and 6c).

Allowable Subject Matter

9. Claim 23 allowed.

10. The following is a statement of reasons for the indication of allowance subject matter: the prior art of record does not teach or suggest the combination of a semiconductor module with a wiring on a substrate, wherein a semiconductor device is mounted on the principle side of the substrate and electrically connected to the wiring. An external connection terminal electrically connected to the wiring arranged on the same side as the device. An insulating resin layer having a thickness greater than the device that is provided between the substrate and the external connection terminal. A heat conductive material layer formed on a external substrate to which the module is mounted and the device of the module is connected to the heat conductive material layer.

The prior art made of record and not relied upon is cited primarily to show the product of the instant invention.

Conclusion

11. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

AC/May 30, 2004

Alonzo Chambliss
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Art Unit 2827